BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL VETERINARY BULLETIN.

VOL. 18.] September, 1930. [No. 3.

DISEASES DUE TO PROTOZOAN PARASITES.

HOEPPLI (R.) & REGENDANZ (P.). Beiträge zur Pathogenese und Histopathologie der Trypanosomeninfektionen der Tiere. [**The Pathogenesis and Histopathology of Trypanosome Infections in Animals.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Jan. & Feb. Vol. 34. Nos. 1 & 2. pp. 1–18; 67–99. With 11 text figs.

Part 1.—Regendanz has examined the fluid contents of the body cavities, excluding the cerebro-spinal fluid, for trypanosomes in various animals and has investigated the histological changes in the organs concerned.

Trypanosomes were found in the pericardial fluid, but there was not invariably any histological change in the epicardium and myocardium.

In one animal numerous trypanosomes were found in hydrocele fluid and in the testicular coverings.

Trypanosomes can make their way from the serous fluids into the substance of organs and set up histological changes.

Trypanosomes were frequently discoverable and sometimes in large numbers in the aqueous humour of the eye in cases in which there was some lesion of the eye, such as turbidity of the lens, irido-cyclitis, keratitis, or conjunctivitis.

From the aqueous humour and from the tissue of the iris trypanosomes reach the conjunctiva, and thence the secretion of the conjunctival sac. Large numbers of trypanosomes reached the tissues from the vessels of the choroid plexus, and they are able to reach the cerebro-spinal fluid in a manner similar to that in which they reach the secretion of the conjunctival sac. The escape of trypanosomes from the small vessels is a result of the toxic action of the parasites. Owing to the persistent action of a weak toxic substance a feeble leucodiapedetic condition of the small vessels develops, and this makes it possible for the trypanosomes to escape from the vessels into the tissues.

Part 2.—The lesions which develop in tissues as a result of the escape of trypanosomes from the vessels appear to depend rather upon the duration of the infection than upon the type of trypanosome responsible for them.

There are, however, differences in the lesions produced in the various species of animals. For example, pronounced changes are frequently

(12463) Wt P2/44 750 9/30 H & Sp Gp 52

found in the heart muscle of apes, while these changes have not as yet been found in cats and dogs. The most important tissue changes resulting from infection with trypanosomes are myocarditis and pericarditis associated with the collection of large numbers of trypanosomes in the inflamed areas. Degeneration of the lens, iridocyclitis, and conjunctivitis result from the presence of trypanosomes in the subconjunctival tissue, in the ciliary body and in the iris.

During the course of an infection with a trypanosome there is a gradual replacement of lymphocytes by plasma cells and macrophages in the spleen and lymphatic glands. In cases which are likely to terminate fatally within a short time examination of the brain reveals degeneration of the ganglion cells.

Macrophages collect in the liver and lungs, and with comparative frequency small centres of necrosis can be found in the liver.

The inflammatory changes occurring in the organs are characterized by the presence of small round cells and macrophages. Plasma cells and polynuclear leucocytes are only scantily represented.

SEEGERT (J.). Untersuchungen über Mal de Cadeiras, ihre Behandlung mit Naganol-Antimosan und die Frage der Übertragung. [**Mal de Caderas. Treatment with Naganol-Antimosan and Transmission.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Feb. Vol. 34. No. 2. pp. 99–123. With 14 text figs.

The author deals with the distribution of the disease at some length, pointing out that it is mainly land that is subject to inundation that is dangerous.

The symptoms of the disease are fully described, and a number of illustrations serve to emphasize certain important clinical appearances.

It not infrequently happens that in typical cases microscopic examination of the blood fails to reveal the presence of trypanosomes. The author therefore thought that they might be "provoked" to enter the blood stream by the application of suitable stimuli. For this purpose he first tried doses of arecoline hydrobromide in doses of 0·025 to 0·05 in 5 cc. of water. The results were gratifying, since trypanosomes could be found in the blood within half an hour. Adrenalin was tried, the author having no further arecolin hydrobromide, but he is of the opinion that it is not so good as the latter drug, although an action is obtained. The author describes the operation of withdrawing cerebro-spinal fluid for examination. Even this does not always yield positive results.

Differential leucocyte counts appear to indicate that lymphocytosis and eosinophilia are likely to occur in cases of mal de caderas.

There are reasons for thinking that the disease is not fly-transmitted. It has been held for many generations by the natives that certain pools which do not dry up even in the driest weather are dangerous for horses to drink from.

In addition to horses, dogs and more particularly pigs can become infected, and it is suspected, but not proved, that the crocodile is also susceptible. Certain wild animals may be victims.

The author holds that if blood-sucking insects are exonerated as transmitting agents, some other blood-sucking parasite must be held responsible, and he states that MIGONE has long thought that leeches are strongly suspect in this connection. The author has been able to find trypanosomes in leeches from a pond which served as a drinking

place for horses, but experimental infection with such trypanosomes has not yet been carried out, and no proof has therefore been furnished as to any relationship between the organism and the disease.

DELPY (L.). Epizootie de Tahaga (*Tr. soudanense*) sur les chevaux du Niger Saharien. [**Outbreak of Tahaga** (*T. soudanense*) **among Horses of the Saharan Niger.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 662–665.

Between September, 1928, and February, 1929, a serious outbreak of trypanosomiasis occurred among horses on the banks of the Niger about 150 kilometres below Gao (Sudan). Microscopic examination showed that the trypanosome resembled *T. evansi*.

The condition was readily distinguished from Souma, which is caused by *T. cazalboui* and *dimorphon*, both by the symptoms presented and by the rapidity with which it ran its course. Souma runs a far slower course than Tahaga. It is characterized by the development of oedema of dependent parts and slow wasting in spite of maintenance of the appetite. In Tahaga there is no oedema, but weakness of the hind quarters, and soon after that paralyses are pronounced symptoms. This disease is far the more fatal of the two.

Moreover, the parasites are recognizably distinct by microscopic examination. Glossina does not occur in the area where the outbreak occurred; it therefore seems probable that transmission was through the medium of Tabanidae and Stomoxys. Under favourable conditions infections with *T. soudanense* can be cured by treatment with 914 and emetic, but in the bush such treatment is not possible.

Where it can be properly applied, 914 in 4 g. doses and emetic in doses of 1·5 to 2 g. are given intravenously every other day until 24 g. of 914 and 6 to 8 g. of emetic have been administered.

FABRE (H. J. A.). Note complémentaire sur la trypanosomiase bovine à la Guadeloupe. [**Complementary Note regarding Bovine Trypanosomiasis in Guadeloupe.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 668–669.

Some four years ago the author published a note on the occurrence of bovine trypanosomiasis in Guadeloupe. Owing to the apathy of owners of cattle he has not been able since that time to get specimens of blood-sucking flies, nor has he been able to get any evidence as to what is the reservoir of the virus.

On three occasions guineapigs have been injected with large doses of blood teeming with trypanosomes, but in no case has infection occurred. The author thinks the parasite is *T. vivax*. Treatment has been limited to isolation and injections of atoxyl, and orpiment by the mouth. Animals treated before the onset of paralysis have been cured sufficiently to return to work, but when paralysis has set in it is advisable to slaughter.

JACOTOT (H.). Essais de traitement du surra par l'emploi du 309 associé au bismuth. [**The Treatment of Surra with 309 and Bismuth.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 669–671.

The bismuth compound used by the author was neo-trépol, metalloid bismuth precipitated directly from tartro-bismuthate of potassium

and sodium, suspended in isotonic water. The 309 was dissolved in this just before use and the mixture was injected intramuscularly. At least one microscopic examination of fresh preparations of blood was made daily after treatment, and in some cases inoculation of dogs and guineapigs was carried out. Two experiments were performed with dogs; doses of 12 cg. 309 in 0·8 cc. neo-trépol, and 6 cg. 309 in 0·4 cc. of neo-trépol were given to dogs weighing 5 and 8 kg. respectively. Trypanosomes disappeared from the blood on the day following injection and had not appeared again during 5 months. Two horses were treated with 1·5 g. of 309 in 10 cc. neo-trépol and ·75 g. 309 in 5 cc. neo-trépol. Trypanosomes disappeared from the blood and had not reappeared in 4 months.

Two buffaloes were given 1·5 g. 309 in 10 cc. of neo-trépol and trypanosomes had not reappeared in 3½ months.

The injections produced no general reaction of any consequence, and there was only a very slight local reaction.

LLOYD (Ll.). **Some Factors influencing the Trypanosome Infection Rate in Tsetse Flies.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 533–542. With 1 text fig.

The author has carried out transmission experiments with two laboratory strains of *T. brucei* separately, and with the two strains mixed. One of the strains when the experiments began had been passed through one dog, twenty-eight rats, and four guineapigs. At the time of the experiments the strain killed white rats in 6 days after inoculation. The other strain had been passed through one rat, two monkeys, and fourteen dogs. The average life of white rats after inoculation was 17 days. The strains were 377 and 135 days old when the experiments began, and the second strain appeared to be distinctly less virulent for white rats than the first. The flies used were *G. tachinoides* bred in the laboratory and special cages were used so that they could be applied direct to the abdomen of guineapigs. The temperature of the laboratory averaged about 77° F., and as this is possibly near the lower limit at which infection in flies can develop, incubators at 85° to 97° F. were used for the flies for a few days at the time of their infecting feed. Flies were dissected at intervals ranging from 11 to 24 days after the first infecting feed and the infections found were classified as:—

(*a*) Light in the gut and likely to die out.
(*b*) Heavy in the gut and likely to mature.
(*c*) Mature with salivary glands infected.

Tabular statements show the series of experiments carried out with flies on the two strains separately and also a series of experiments in which the flies were fed upon animals infected with the two strains alternately. The idea of this latter series was to see whether any evidence could be adduced that mixing an older and a younger strain increased the proportion of infected flies.

"If all factors but the characters of the strains of the trypanosomes in the animals are excluded, one gets from these transmission experiments this result: 355 flies which had fed on either strain C or D were dissected, one mature and three heavy immature infections resulted, a total of 1·1 per cent. 277 flies were dissected after feeds on both

strains, giving fifteen mature infections and seven heavy immature infections, a total of 7·9 per cent."

Detailed consideration of the infections following the mixing of the feeds shows that in the individual groups of flies the variation in the proportion infected was enormous, and this variation makes it impossible to arrive at the conclusion definitely that the mixing of the strains was responsible for the higher rate of infection.

The author discusses the views which have been put forward regarding the factors controlling the proportion of flies becoming infected. In the course of the paper the author refers to some unusual flagellate forms found in the midgut of the fly.

(1) A long whip-like crithidial form which appears to be identical with KLEINE'S "male form" and those described by Miss ROBERTSON, Lloyd and JOHNSON. In some preparations this form was abundant.

(2) The same form throwing off from the posterior end a tiny slender crithidial form which at division has its flagellum projecting at right angles to the body.

(3) The same small crithidial form lying free.

This dividing form was seen only in four preparations, but in one of these it was abundant. These were all from flies fed with the mixed strains, but there were three times as many preparations from these as from the other strains.

MACHATTIE (C.) in collaboration with CHADWICK (C. R.). **Notes on a Trypanosome Infection of the Dog Tick** *Rhipicephalus sanguineus* **in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Jan. 30. Vol. 23. No. 4. pp. 417–419. With 12 figs. on 1 plate.

The authors summarize the literature with regard to the detection of flagellates in ticks. Of six ticks removed from a dog suffering from leishmaniasis (cutaneous) two were found by examination of sections to contain flagellates. Careful examination and cultivation of the dog's blood yielded no evidence of trypanosome infection. Inoculation experiments also failed. At post-mortem no evidence of trypanosomiasis or leishmaniasis could be found in the dog. It appears to be probable that the flagellate was derived from some other host, and also that it was identical with *Crithidia christophersi*.

SCHWETZ (J.) & FORNARA (L.). Y a-t-il des formes d'évolution des trypanosomes chez l'hôte vertébré? [**Do Developmental Forms of Trypanosomes occur in the Vertebral Host?**]—*Bull. Soc. Path. Exot.* 1929. Nov. Vol. 22. No. 9. pp. 862–874.

The authors record some observations made at Stanleyville which they hold throw some light upon the question whether developmental forms of trypanosomes occur in the vertebrate host.

The authors have been largely occupied with experiments connected with the treatment of trypanosomiasis and they admit that their results are for the most part only mediocre. They find that animals infected with *T. congolense* are the most resistant to treatment. This resistance appears to be of two types. In one type of case trypanosomes persist in the blood in spite of long-continued treatment, and in the other trypanosomes cannot be detected microscopically by any method and yet the animals steadily lose condition and finally

die in a state of complete prostration. In such cases one may find a trypanosome or two in the heart blood or in the heart " juice." Various degenerating forms are to be found if an interval has elapsed between the death of the animal and the examination, the types found depending upon the interval.

On one occason when smears were made from the heart muscle of such a case for sarcocysts collections of organisms resembling leishmania were detected. It seemed possible that these represented special forms in the tissues, and a search was therefore made in sections from the heart muscle and other organs of animals dead of trypanosomiasis or killed *in extremis.* In the capillaries of the heart, lungs, and spleen they have found the special forms which they term " chromatic bodies " and which present two chromatin masses—one large and the other small. The authors have already published two notes on the occurrence of these bodies. Brief details of the histories of eight cases of trypanosomiasis are given and a detailed account of the findings as regards trypanosomes and chromatic bodies in the case of one of them. The other seven cases would appear to have been negative as regards trypanosomes at the time of death or slaughter when *in extremis.*

In the case in which trypanosomes were found in very small numbers in the blood at the time of death smears were made from the myocardium, lymphatic glands, liver, meninges, brain, kidneys, spleen, peritoneum, pleura and lungs. Trypanosomes were found in those from the heart muscle, glands, meninges, pleura and lungs, while in the smears from the brain both trypanosomes and leishmania forms were detected. In sections from the brain and heart muscle leishmania forms were present, particularly in the former. These were found exclusively in the capillaries. Drawings of the forms found are given.

The authors have also had the opportunity of examining sheep and pigs infected with trypanosomes, and details are given of one pig which showed large numbers of trypanosomes in its blood. The parasites are said to have been rather longer and more slender than *T. congolense,* and to resemble rather *T. dimorphon.*

The following lists show the results of examination of smears and sections made from various organs, as regards the trypanosomes or leishmania forms found.

	Smears.
Intestinal wall ...	Trypanosomes.
Kidneys	Trypanosomes and leishmania forms free or within phagocytes.
Liver	Trypanosomes and leishmania forms.
Myocardium	Trypanosomes, with dividing forms, leishmania forms free and within phagocytes, leishmania forms dividing.
Spleen	Leishmania forms free and phagocytes.
Lungs	Trypanosomes and leishmania forms.
Ovaries	Trypanosomes and leishmania forms.
Cerebro-spinal fluid ...	Negative.
Brain	Trypanosomes and leishmania forms.
	Sections.
Brain	Trypanosomes and leishmania forms scantily present in the capillaries.
Myocardium	Very rare leishmania forms.
Spleen	A group of leishmania forms in a sinus.

The authors incline to the view that the structures are not merely degenerating trypanosomes because they are not found in the peripheral blood, and further that they are not produced by post-mortem alterations since they are found when animals, killed *in extremis*, are examined immediately after death. They think that the structures represent a phenomenon analogous to the dividing forms of *Plasmodium falciparum*, and there is a resemblance to the structures found in the organs in cases of infection with *Schizotrypanum cruzi*.

They emphasize the fact that only very rarely have they found these chromatin masses surrounded by a membrane of any kind; as a general rule, only the large and small chromatin mass can be made out without any cytoplasm at all.

Sicé (A.) & Malbrant (R.). Nouveaux essais de préservation des bovidés contre les trypanosomes par le 309 Fourneau. [**New Attempts to protect Bovines against Trypanosomes by Fourneau 309.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 776–779.

It was intended to carry out parallel tests with 270 F. and 309 F., but only the latter drug was actually available for the purpose. The tests were carried out on a herd of cattle going from Chad to Bangui. Twenty head ranging from 4 to 7 years old, and all free from trypanosomiasis, left Melfi on March 12th. No preliminary protective injections were given, as these were to be used only when dangerous areas were reached.

A week later when the animals approached a fly area at Korbol 12 animals were given 3 to 5 g. of the drug subcutaneously.

The injections produced marked local reactions and some amount of systemic disturbance, but these disappeared within 48 hours. The herd left Korbol on March 21st and four days later began to pass through a succession of fly zones. Fly zones were traversed during the day. From March 13th, 19 days after Glossina had first been encountered, and 25 days after the injections of the drug had been given, some of the animals presented suspicious symptoms, and on arrival at Fort Crampel on the 18th, of the 11 injected animals (one having died of piroplasmosis) 3 were found to be infected with *T. cazalboui*, and 3 of the 8 controls were similarly infected.

Five of those already injected received on April 18th a second subcutaneous injection of 3–5 g. according to their size.

On arrival at Bangui there were only 14 survivors of the original 20 which could be grouped as follows :—

A. Animals having only one injection, 3.	Infected at Crampel, 1
B. Animals having two injections, 4.	Infected at Crampel, 0
C. Controls, 7.	Infected at Crampel, 2

Summarizing the whole experiment :—

Of 7 animals receiving one injection, 3 became infected.
Of 5 animals receiving two injections, 1 became infected.
Of 8 controls, 4 became infected.

The drug therefore seems to be of little or no value as a protective in doses of 5 to 7 cg. per kilo. Possibly larger doses might be more effective.

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Sicé (A.) & Malbrant (R.). Nouveaux essais de préservation des bovidés contre les trypanosomes par le 309 Fourneau. [**New Attempts to protect Bovines against Trypanosomes by Fourneau 309.**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 776–779.

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BOYNTON (W. H.). **Studies on Anaplasmosis in Cattle with Special Reference to (1) the Susceptibility of Calves born of Recovered Cows, and (2) the Length of Time Recovered Animals may remain Carriers.**—*Cornell Vet.* 1929. Oct. Vol. 19. No. 4. pp. 387–395.

In range cattle anaplasmosis is responsible for loss of condition and stunting of growth, but in dairy cattle it is of far greater economic importance because the mortality in some instances is very high, and when recovery takes place three months may elapse before milk production reaches the normal level again. There is some doubt as to the transmitting agent in California. HELM showed that *Ixodes ricinus* would transmit *Anaplasma marginale*, but not *Piroplasma bigeminum*. The author has found *Ixodes ricinus* var. *californicus* on one animal affected, but it has not been found in subsequent cases. STILES reports the presence of *Ornithodorus megninii* on diseased animals. Boynton has noticed this tick in two outbreaks in range cattle. CALDWELL is said to be encountering outbreaks in range and dairy cattle which in most instances are tick-free; it is added that *Tabanus punctifer* O.S. is present in large numbers.

In seeking answers to the two questions (1) Do recovered animals remain carriers, (2) Are calves born of recovered animals carriers, or are they immune, three calves were used for experimental purposes. Details of these three animals are given and from these it is gathered that the calves born of infected cows are not infected, are not immune, and can be infected with the strain harboured by their dams.

As anaplasmosis runs a mild course in calves it is not possible to say whether there was any increased amount of resistance to infection possessed by these calves.

The cows which produced the calves were kept under observation for some time, and their blood was tested at intervals. It was found that they were still carriers for periods ranging from 5 months to 2 years and 2 months.

DONATIEN (A.) & LESTOQUARD (F.). Les anaplasmoses des ruminants. [**The Anaplasmoses of Ruminants.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1930. Mar. Vol. 82. pp. 125–139. With 2 figs.

This paper is a summary of existing knowledge, and its publication is apparently called for on account of the recent accidental infection of animals in Normandy.

MILLS (E. A.) & MACHATTIE (C.) in collaboration with CHADWICK (C. R.). **A Preliminary Note on the Relationship of the Parasites of Human and Canine Dermal Leishmaniasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Jan. 30. Vol. 23. No. 4. pp. 413–416. With 2 plates.

Human cutaneous leishmaniasis is very prevalent in Baghdad, and dermal infection in dogs is of more frequent occurrence than has been supposed. Morphologically and culturally the parasites occurring in the two lesions are indistinguishable.

In Baghdad and its environs the distribution of the two conditions is the same. Similarly the seasonal distribution of the two diseases is the same. Cases in human beings and in dogs occur from towards

the end of September to January. Clinically the diseases present slight differences. The cutaneous lesions of dogs generally heal completely within 6 months, while in the human disease the period required is about 9 months.

Phl. sergenti and *Phl. papatasii* can be infected with cultures from canine lesions and both feed readily upon dogs. The human and canine conditions resemble one another in that the lesions develop at places exposed to sandfly bites, and also in that infection produces no constitutional disturbance.

Details are given of serological reactions produced by the addition of immune sera to cultures. The results indicated a very close relationship if not actual identity.

SCHEWTSCHENKO (F. I.), SKWORTZOW (P. A.), BATURIN (I. I.) & MILKOW (W. S.). Die Hundeleishmaniose in der Neustadt Taschkent (nach der Untersuchungsmaterialien der 1926–1929 Jahren). [**Canine Leishmaniasis in Tashkent.**]—*Pensée Méd. d' Usbequistane et de Turqumenistane.* Tashkent. 1929. Oct. No. 1. pp.46–54. [In Russian script. German summary p. 102.]

Canine leishmaniasis is not of frequent occurrence in Tashkent. During the period 1926–1929 over 35,000 dogs were examined, and the percentage found infected during the four years ranged from 0·67 to 0·31. Most of the cases occurred in stray dogs.

RIEDMÜLLER (L.). **Trichomonads in Connection with Abortion in Cattle.**—*Jl. State Med.* 1930. Jan. Vol. 38. No. 1. pp. 40–47.

The author refers to the literature regarding the occurrence of trichomonads in the genital tract of cows and in the alimentary canal of bovine foetuses. He has previously recorded that he has found trichomonads twice in pure culture, once associated with *B. abortus*, Bang, and six times with saprophytes (8·5 per cent. of cases of abortion). Of seven transmission experiments to guineapigs only one succeeded. Intraperitoneal injection of 0·5 cc. of foetal stomach contents caused death from peritonitis in 16 days. The exudate contained the flagellates with a few diplococci. "Further experiments in inoculation showed one case of premature birth, two cases of abortion, one case of death i.p. Only one guinea pig recovered after abortion. Of 127 subsequent examinations 7·8 per cent. of the cases showed these trichomonads (in nine foetuses of cattle and in one foetal stomach). . . . . Only twice have they been found in pure culture."

The organisms range from 10 to 15μ long by 5 to 10μ wide. They are napiform, pyreform, fusiform, or oviform in shape. Three flagella, averaging 15μ in length emerge from the anterior end of the body, taking original from a blepharoplast, at the upper end of the axostyle; the blepharoplast appears to be composed of three closely connected granules with a further granule from which the undulating membrane with a marginal filament arises. The nucleus measuring 5–7μ by 2–3μ lies near the axostyle in the anterior half of the body.

No success has been obtained in cultural experiments.

Further transmission experiments have been carried out, and in 2 out of a total of 13 attempts transmission was achieved. The

infection was carried on in guineapigs by successive passages. Associated bacteria were not pathogenic to guineapigs, and the parasite caused a fibrinous peritonitis.

In transplantation experiments to 60 guineapigs, gravid animals aborted. In some cases death occurred before the foetus was discharged. In about 10 per cent. of animals the injection produced no recognizable change at all. With regard to the clinical significance of the organism the author suggests that it is probable that they have been overlooked by bacteriologists in stained preparations because of their resemblance to tissue cells.

The author discusses the question whether it is justifiable to attribute pathogenic properties to trichomonads found in various conditions, and appears to favour the view that it is.

SCHWETZ (J.) & STORCK (N.). **On a Case of Triple Infection in a Cow —*Piroplasma bigeminum, Gonderia mutans* and *Trypanosoma uniforme*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 637–639. With 1 plate.

The authors record this case because it is the only occasion upon which they have encountered *P. bigeminum.* 1,000 head of cattle—400 of which had been at Stanleyville for many years, and the remainder had just arrived from Ituri-Uele and Kivu-Ruanda—were examined. *Gonderia* (*Theileria*) *mutans* is far from rare, but the trypanosome—*T. uniforme*—has not been recorded in the Belgian Congo.

RIDING (D.). **Haemoproteus of** *Tarentola annularis*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 635–636. With 3 figs. on 1 plate.

The author figures and describes a pigmented parasite of three out of twenty geckos caught in Khartoum. The male and female gametocytes were alone discoverable. An associated haemogregarine was demonstrated in each case.

There was apparently no disturbance of health, even though in one case 40 per cent. of the corpuscles were invaded.

In hanging-drop preparations in 2 per cent. glucose peptone at 70° F. the formation of male gametes, fertilization and the formation of the oökinete were observed. No stages of the asexual cycle could be found in smears from blood or organs of the infected animals.

The parasite resembled but was smaller than *Haemoproteus mesnili.*

RASTÉGAÏEFF (E. F.). (1) *Eimeria mesnili* n.sp. chez *Canis lagopus,* (2) Coccidie chez le tigre, (3) *Eimeria felina* Niesch. chez la lionne, (4) La coccidiose chez le bison. [**(1) *Eimeria mesnili* n. sp. in the Arctic Fox, (2) Coccidiosis in the Tiger, (3) *Eimeria felina* Niesch. in the Lioness, (4) Coccidiosis in the Bison.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 640; 640; 641; 641–642.

In four short notes the author records the following parasites.

1. An Eimeria measuring 18μ by 10·8 to 14·2μ in the faeces of an Arctic fox. The parasite was tetrasporous without residual body.

2. The parasite found in the faeces of a tiger in the Zoological Gardens at Leningrad measured 14·4μ to 15·3μ and was practically spherical in shape. No micropyle could be seen. The name *Eimeria novowenyoni* n. sp. is proposed.

3. The parasite which the author found in the faeces of a lioness at the Leningrad Zoological Gardens is considered to be *Eimeria felina.*

4. As yet no coccidium has been described as occurring in the bison. The faeces of bison of North American origin in the Leningrad Zoological Gardens were found to contain oocysts measuring 16·2 to 28·8μ by 14·4 to 19·8μ. The micropyle is said to measure 5·4μ.

The author believes that the parasite is *Eimeria smithi.*

SCHWETZ (J.) & COLLART (A.). **Notes on Protozoa found in the Blood of Rats and Mice in the District of Lake Albert.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Mar. 17. Vol. 23. No. 5. pp. 529–532. With 4 figs. on 1 plate.

Of 172 specimens of *Mastomys ugandae,* de Wint., 59 showed Grahamella, 9 *Tr. lewisi,* and 4 Babesia, and of 128 specimens of *Arvicanthis abyssinicus rubescens,* Wr., 5 showed Grahamella, 13 Babesia, and 1 Hepatozoon.

Hepatozoon arvicanthis is a new species. It occurred in leucocytes, but the authors find it difficult to identify the exact type of cell invaded. They most closely resembled transitional cells. The parasite differed largely in measurement from the measurements given by BALFOUR, STEPHENS and CHRISTOPHERS, and LAVIER. The parasite measured 11μ by 1·75μ. The cytoplasm is granular, the nucleus is compact and varies in position, and in most cases a small chromatic body in an extranuclear position can be identified. Only blood films were examined, so that nothing can be said about developmental stages.

The Babesia found in the two species of rats has the name *Babesia ratii* proposed for it, although it is said that it may be identical with *B. decumani* or *B. avicularis.*

YAKIMOFF (W. L.) & RASTÉGAÏEFF (E. F.). Epizootie de spirochétose des poules à Piatigorsk (Nord du Caucase). [**Epizootic of Avian Spirochaetosis at Piatigorsk (Northern Caucasus).**]—*Bull. Soc. Path. Exot.* 1929. Nov. 13. Vol. 22. No. 9. pp. 764–765.

The authors record an outbreak of spirochaetosis in poultry during the hot summer of 1929. The period of incubation after infection through *Argas persicus* was 4–7 days. *Aegyptianella pullorum,* Carpano 1929, was not encountered. During the course of the disease there was a diminution in the number of lymphocytes and an increase in the polynuclears. Atoxyl 0·1 g. to 0·12 g. per kg. gave good results in the treatment of the condition. Stovarsol was also satisfactory. Orsalan was more toxic. Bijochinol, a bismuth compound, was useless.

Chicks have been immunized by simultaneous injections of *S. gallinarum* and drugs, and of mixtures of infected blood and atoxyl and other drugs.

SCHWETZ (J.) & COLLART (A.). Notes protozoologiques. Spirochètes sanguicoles chez *Cobus vardoni* et *Gonderia mutans* chez *Cobus ellipsiprymnus* et chez *Ourebia hastata.* [**Protozoological Notes. Blood Spirochaetes in** *Cobus vardoni* **and** *Gonderia mutans* **in** *Cobus ellipsiprymnus* **and** *Ourebia hastata.*]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 651–656. With 3 text figs.

SCHWETZ (J.) & GEERINCK. Sur quelques parasites sanguicoles des rongeurs de Stanleyville (Congo Belge). [**Blood Parasites of Rodents in Stanleyville (Belgian Congo).**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 657–661. With 1 text fig.

DISEASES DUE TO METAZOAN PARASITES.

LEGG (J.). **The Buffalo Fly Menace in Queensland.**—*Australian Vet. Jl.* 1929. June. Vol. 5. No. 2. pp. 43–46.

The buffalo fly was probably introduced with buffaloes from Timor in the early days of settlement, and it has been known for many years in the Northern Territory. It has gradually spread and recently it reached the Queensland border. In Western Australia a belt of sheep country is apparently arresting its spread—at any rate for the time being.

The importance of the fly from an economic point of view is well recognized, and by some it is considered of importance equal to that of the tick.

Wet seasons appear to be particularly favourable to the fly, and in cold dry weather they cease to be of any significance. The bite of the fly is very irritating and causes animals to rub themselves against trees and bushes, thus setting up sores which subsequently become infected.

There appears to be every prospect of the fly spreading, and it is now entering an area in Queensland where the cattle population is much denser than in the adjacent area of the territory, and transport of animals by rail will facilitate its spread. The fly has spread along the same route as that followed by the tick in the 'nineties of the last century.

There is no means of attacking the fly on its host; dipping is effective for a few hours only and oil dressing is impracticable. It has been decided to try the effect of a cattle free barrier across the corner of Queensland already invaded as a check to the further spread. The fly is *Lyperosia exigua.*

DAVENPORT (C.). **A Note on the Occurrence of** *Hypoderma crossi* **in Goats in Baluchistan and the Question of the Fitness of the Meat for Human Consumption.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Jan. 30. Vol. 23. No. 4. pp. 425–426.

The author records the extensive infestation of goats supplied as rations to Indian troops with *Hypoderma crossi.* 90 per cent. of the animals were affected and some had as many as 50 larvae. The lesions were almost exclusively confined to the back near the spine. In no case was any suppuration seen.

Interest attaches to the report because the cases occurred in Baluchistan. Previously the condition had been recognized in the Punjab only. The contractor was emphatic in stating that the goats were all of local origin and had not been brought from the Punjab. The

author does not feel justified in stating that the parasite is definitely indigenous to Baluchistan. Further evidence will be required.

From the point of view of meat inspection, and it was because certain troops objected on this score that the extensive examination was carried out, the author states that there was no evidence whatever that any tissue other than the skin was affected. In spite of heavy infestation there was no trace of even superficial inflammation of the underlying muscles.

FREUND (L.). Lungenwürmer des Silberfuchses. [**Lungworms of the Silver Fox.**]—*Prager Arch. f. Tiermedizin.* 1929. Vol. 9. Part A. No. 1 & 2. pp. 33–48.

Two worms occur in the lungs and bronchi of silver foxes, *Crenosoma vulpis*, Dujardin 1845, and *Capillaria aerophila*, Creplin 1839, Railliet 1915. They may also occur in the nasal cavity, and they may be present in the intestinal contents, which they reach as the result of their having been coughed up and then swallowed.

Crenosoma vulpis measures 8 mm. (male) and 15 mm. (female) and presents the general characters of a strongyle [no exact details are given]. The worm is ovo-viviparous. It is assumed, in the absence of definite information, that the life history is like that of other strongyles. *Capillaria aerophila* (also called *Eucoleus aerophilus*) is a very slender parasite. The males measure 24 mm. and the females 24–32 mm. The greatest thickness is 0·1 to 0·18 mm. The eggs of this worm show the typical form of having a plug-like structure at each end. The worm is not oviparous and not ovo-viviparous. The life history is not definitely known.

The author discusses briefly the question of the nomenclature of this worm, as to whether Capillaria or Eucoleus is correct.

The symptoms presented are those of bronchitis and pneumonia. No symptoms are known to accompany the migration of the larvae to the lungs from the intestine. Severe infestations may produce wasting, anaemia, inferior skins, and finally death may occur. Secondary bacterial invasion is likely to play some part in this.

Control of the conditions caused by the worms is best achieved by preventing infection and re-infection. Careful destruction of faeces is of the greatest importance. Medicinal treatment follows the usual lines, and it is certain that drugs given by the mouth are of no value whatsoever. Intratracheal injections may have some value.

MÖNNIG (H. O.). **Investigations into the Life-History of the Tapeworm *Moniezia expansa*.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 317–327.

The author reports briefly negative results in attempts to trace the life-history of this worm. He summarizes the possibilities regarding the nature of the life-history and refers briefly to the work of other investigators.

BEDFORD (G. A. H.). **Notes on some South African Ticks, with Descriptions of Three New Species.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 493–499. With 5 figs. on 3 plates.

CAWSTON (F. G.). **Schistosomiasis bovis in South African Sheep, Cattle and Man.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 641–642.

LE ROUX (P. L.). **Remarks on the Habits and Pathogenesis of** *Schistosoma mattheei*, **together with Notes on the Pathological Lesions observed in Infested Sheep.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 347–406. With 47 figs.

LE ROUX (P. L.). **Notes on the Life-Cycle of** *Schistosoma mattheei* **and Observations on the Control and Eradication of Schistosomiasis in Man and Animals.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 407–438. With 1 plate and 41 figs. (This paper contains an extensive bibliography.)

LE ROUX (P. L.). **Two Species of** *Haemonchus* **Cobb, 1898, Parasitizing the Camel in the Cape Province.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 439–450. With 15 figs.

LE ROUX (P. L.). **A Preliminary Report on Three New Members of the Genus** *Haemonchus*, **Cobb, 1898, from Antelopes in South Africa.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 451–463. With 24 figs.

MÖNNIG (H. O.). *Physaloptera canis*, **n. sp. A New Nematode Parasite of the Dog.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 329–333. With 4 figs.

MÖNNIG (H. O.). **The "Guinea Worm" of the Ostrich,** *Contortospiculum spicularia.*— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 299–302. With 4 figs.

MÖNNIG (H. O.). *Hypodontus macropi* **n. gen., n. sp., a Hookworm of the Kangaroo.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 303–306. With 5 figs.

MÖNNIG (H. O.). *Filarinema flagrifer* **n. gen., n. sp., a Trichostrongylid Parasite of the Kangaroo.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 307–310. With 5 figs.

MÖNNIG (H. O.). *Agriostomum equidentatum*, **n. sp., a Hookworm of the Springbuck.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 311–316. With 8 figs.

VEGLIA (F.) & LE ROUX (P. L.). **On the Morphology of a Schistosome** (*Schistosoma mattheei*, **sp. nov.) from the Sheep in the Cape Province.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 335–346. With 22 figs.

BACTERIAL DISEASES.

EDGAR (G.). **Some Observations bearing on the Aetiology of Black Disease.**—*Australian Vet. Jl.* 1929. June. Vol. 5. No. 2. pp. 55–59.

The author discusses the organisms isolated from cases of black disease and similar conditions and concludes that *B. oedematiens* is the organism responsible for these conditions. It was suggested by DODD that fluke infestation played some part in the production of black disease, and experiments in the control of fluke infestation appear to have had an important bearing upon the elimination of black disease. The fluke control has involved the treatment of sheep with carbon tetrachloride and of the water sources with sulphate of copper. It is emphasized that the experiments were carried out for the most part in districts where the natural formation of the country allowed the water courses to be treated effectively. Marshy land complicates the problem, but drainage followed by treatment with copper sulphate has been effective.

It has generally been recommended that treatment of sheep with carbon tetrachloride and copper sulphate for the water supplies be both employed, but in one instance at least it was clearly shown that carbon tetrachloride alone given every month eliminated black disease on a previously heavily infected premises.

BULL (L. B.). **"Swelled-Head" in Rams.**—*Australian Vet. Jl.* 1929. June. Vol. 5. No. 2. pp. 54–55.

This is a brief abstract of a paper read before the Australian Veterinary Association. The available evidence suggests that *B. oedematiens* is responsible for the condition.

GREEN (W. J. B.). **Immunization against Anaerobes of the Gas-Gangrene Type in South Africa by means of "Anatoxins."**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 193–221.

This paper is divided into 2 parts. The first deals with immunization against anaerobes of the gas gangrene type with formalinized antigens and treats of blackquarter, vibrion septique, *B. welchii* and *B. oedematiens* in turn. The second, and shorter portion contains an account of experiments in connexion with the pathogenesis of blackquarter.

The author confirms the superiority of formalinized whole culture over other methods of immunization, and finds that the bacillary bodies as well as the exotoxin when acted upon by formalin act as immunizing agents. Vaccine prepared in this way is stable. There was no diminution in value after storage for 6 months at room temperature. An exactly parallel process produces an efficient vaccine against infection with vibrion septique, and the two vaccines can be used effectively together. With *B. welchii* vaccine produced in this way, two or more injections are necessary to produce a good immunity.

In attempts to infect animals with blackleg by natural paths the author obtained no success. Positive results were achieved only when the material was introduced beneath the skin. Intradermal injection fails.

MARTINAGLIA (G.). **Diseases of Domesticated Animals in South Africa due to Organisms of the Salmonella Group.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 233–295. With 32 figs. and 6 charts.

The author records the following :—
Calf typhoid due to *S. enteriditis* and *S. aertrycke.*
Tendo-vaginitis of horses due to *S. abortivo-equinus.*
Bacillary white diarrhoea of chickens due to *S. pullorum.*
Fowl typhoid due to *S. gallinarum.*
Canary typhoid due to *S. aertrycke.*
The lesions in horses have been encountered in horses and mules in the process of immunization against horse-sickness.

SCHEUBER (J. R.). **A Note on Investigations into the Distribution of the Lamsiekte Organism** (*Cl. parabotulinum* **C Type**).—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 223–226.

Having controlled the technique with infective materials, samples of soil from beneath and near carcases dead of the disease, materials from animals dead of lamsiekte, and faeces of living animals were tested.

Soil from beneath or very near carcases was found to be infected with toxin-producing organisms, but over a hundred samples of soil free from carcases gave negative results. More than half the animals dead of lamsiekte (26 in all) yielded toxic cultures from the intestinal contents, while only 3 out of 47 cases dead from other causes yielded positive results.

50 normal animals dosed with bone meal had samples of faeces from the rectum tested. Toxic cultures were obtained from 2 of these. Of 42 control cattle not dosed the faeces of 5 yielded toxic cultures.

QUIN (J. I.). **Studies on Anthrax Immunity.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 129–182.

This report embodies experimental work carried out between 1925 and 1928, the objects of which were :—

(*a*) To attempt the production of a non-living yet efficient immunizing substance against anthrax.

(*b*) To compare the relative values of different methods of immunization with anthrax spore vaccine. The latter experiments were conducted mainly with a view of ascertaining the value of cuti-vaccination, as advocated by BESREDKA and others, in comparison with the methods usually employed in S. Africa.

In a preliminary section the author discusses species, susceptibility and immunity, and in this connexion he points out that guineapigs are particularly susceptible even to weak strains, and that it is almost impossible to immunize them. Rabbits are less susceptible to weak strains, but they develop a very weak and uncertain degree of immunity. South African goats are very susceptible to infection, even weak vaccines will sometimes kill. The immunity is, as a rule, fairly strong, but is inclined to be inconsistent. Merino sheep present a well-marked susceptibility and acquire a solid immunity. Cattle appear to be naturally the most susceptible species, but difficulty may be experienced in infecting artificially. Horses appear to be very variable in their reactions to artificial infection. In view of these circumstances care had to be exercised in interpreting results. As sheep, and particularly merino sheep, appeared to be the most constant in their reactions, they were mainly used in the experiments, and they were largely obtained from the Karoo where anthrax is not of frequent occurrence and no extensive vaccination is carried out.

The author then describes experiments connected with the production of attentuated strains, and with the possible production of a toxin by the bacillus. In attenuating cultures by incubation at 42° C. the process should not be hastened. There is some evidence to show that strains attenuated hurriedly may recover virulence, and also that strains or even individuals of a strain vary in their response to attenuating conditions.

The use of uncommon media did not accelerate attenuation, and no decrease of virulence could be shown to follow freezing and thawing. Sterile products derived from disintegration of the bacilli by either physical or chemical means could not be shown to possess either toxic or antigenic properties.

Both spores and vegetative elements which have been thoroughly washed are capable of infecting or of immunizing.

Blood withdrawn from animals at the time of death from virulent anthrax, sterilized by chemical means, possesses well-marked immunizing properties. This capacity persists in blood for several months, and it is capable of resisting heating to 92° C. for half an hour. Filtrate from freshly drawn anthrax blood shows no such properties. The chemicals used for destruction of the bacilli in the blood drawn just prior to death were neosalvarsan and anilin gentian violet. Of the former a 1 in 5,000 solution killed anthrax cultures and sterilized blood in 2 hours, and anilin gentian violet was effective in 24 hours at 1 in 2,000 concentration.

The author found that the nature and degree of immunity following intradermal vaccination with spore vaccine is not stronger nor more lasting than that produced by subcutaneous injection. With a weak spore vaccine the intramuscular path appears to establish the strongest immunity.

Attempts were made to ascertain the cause of the oedematous swellings frequently occurring in anthrax in horses. There was no constancy about the production of such swellings with vaccine and nothing in the nature of a toxin could be detected to account for their production.

BEKKER (J. G.). **The Relation of the Virulence of Attenuated Anthrax Strains to their Immunizing Value.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 183–191.

The author could not establish a definite relationship between the immunizing value of a strain and the degree of attenuation.

KITSELMAN (C. H.). **Malta Fever Investigations and Observations.**—*Cornell Vet.* 1929. Oct. Vol. 19. No. 4. pp. 407–408.

During the winter 1928–29 seven cases of undulant fever were diagnosed in Kansas City, and all gave high reactions to agglutination tests. In 1927 a case occurred in a soldier at Fort Riley, Kansas, and two more in the spring of 1928. The regiment owned a herd of 13 cows, of which four were positive to the agglutination test for abortion. Attempts to isolate the abortion bacillus from the milk of these cows either directly or by guineapig inoculation failed.

Blood tests were then carried out with samples from 264 men in the regiment. *Brucella melitensis* and *B. abortus* emulsions were both used.

Three cases convalescent from undulant fever gave reactions ranging from 1 in 50 to 1 in 2,400 with one or both of the antigens. Five other normal men gave reactions 1 in 25 to 1 in 50 with one or both antigens (all except one with both).

The regiment had a herd of pigs and had been slaughtering their own animals prior to the beginning of the investigation. The herd had been slaughtered before the third case was diagnosed. The author thinks that the pigs, rather than the cows, were the source of infection, but as the herd had been killed off before the investigation began it is impossible to furnish any evidence of this.

PANISSET (L.). La fièvre ondulante et l'avortement épizootique. Transmission à l'homme. [**Undulant Fever and Epizootic Abortion. Transmission to Man.**]—*Rev. Gén. Méd. Vét.* 1930. March 15. Vol. 39. No. 459. pp. 129–138.

The author summarizes the history of the two diseases and recounts the present position.

ROBINSON (E. M.). **Notes on Botulism in the Domesticated Animals.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 97–110.

ROBINSON (E. M.). **Notes on a Few Outbreaks of Botulism in Domesticated Animals and Birds.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 111–117. With 2 figs.

ROBINSON (E. M.). **A Note on** *Corynebacterium ovis* **(Bacillus of Preisz Nocard).**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 119–121.

MYCOTIC DISEASES.

BERGEON. A propos de trois cas d'aspergillose animale. [**Three Cases of Aspergillosis in Animals.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1929. Feb. Vol. 7. No. 2. pp. 116–121.

Case 1. A heifer in good condition having considerable enlargement of the parotid region. There was no systemic disturbance, and the swelling was practically painless. A tentative diagnosis of actinomycosis was made, but appropriate treatment with iodine was without result. Application of a mercurial ointment lead to softening of the swelling and a large amount of pus was evacuated. Cultures showed only staphylococci and streptococci. Later symptoms of generalized infection occurred, mainly characterized by difficulty of respiration. Later, there was a grumous nasal discharge which was streaked with blood, and marked salivation. The urine contained a large amount of albumen, and there was profuse diarrhoea, and the animal died. The surface of the lungs showed a large number of tubercle like growths which ranged in size from a pea to a pigeon's egg. These were found to contain a creamy pus mixed with " granules of a sulphur-yellow colour." The cortex of the right kidney contained some yellow nodules, while the left was enormously enlarged, weighing 3·7 kg. and having the appearance of a blood clot. The mesenteric glands were enlarged and formed a caseous mass. Cultures from the nodule lesions on Sabouraud's medium yielded cultures of *Aspergillus niger.*

Case 2. Annamite bull about 5 years old. This animal was in poor condition and was suffering from alternating attacks of constipation and diarrhoea. When forced to walk there was distinct " roaring " in the respiratory sounds. There was evidence of pulsation of the jugular veins. Exploratory puncture failed to reveal any evidence of traumatic pericarditis.

Death occurred about 2 months after the animal had come under observation.

There were numerous adhesions between the pleural surfaces, and the lungs contained a large number of nodular lesions, as in the previous case. The bronchial glands formed an enormous caseating mass which pressed on the trachea and vessels at the entrance to the chest.

The kidneys and liver contained yellow nodules. Cultures on Sabouraud's medium yielded *Aspergillus niger.*

Case 3. A stag from the Botanical Gardens at Hanoi was taken to the Veterinary College as it was affected with rinderpest. After it had recovered it was observed that there was a suppurating fistula of the right buttock. Treatment was attempted, but was difficult, as the animal was wild. Shortly afterwards evidence of pulmonary involvement appeared and the animal died.

At the post-mortem examination it was found that the fistula led into the pelvic cavity and terminated between the rectum and the bladder, where there was a large abscess containing thick yellowish-white pus. The peritoneum was involved, there were caseous tubercles in the renal cortex, and lesions like those found in Case 2 were present in the thoracic organs. *Aspergillus niger* was obtained.

Le Souef (A. S.) & Seddon (H. R.). **Streptothrix Disease in Kangaroos.**—*Australian Vet. Jl.* 1929. June. Vol. 5. No. 2. pp. 79–80.

DISEASES DUE TO FILTERABLE VIRUSES.

Delpy (L.), Cauvin & Riou. Contribution à l'étude de la rage en A.O.F. Transmission de la rage du chien (oulou fato) à l'homme et au guépard. [**Rabies in French West Africa. Transmission of Rabies from the Dog (Mad Dog) to Man and to the Cheetah.**]—*Bull. Soc. Path. Exot.* 1929. Oct. 9. Vol. 22. No. 8. pp. 635–639.

The author describes a case in which a woman who had been bitten by a " mad dog " two and a half months previously died after having shown fits of fury interspersed with periods of torpor. Apparently no exact diagnosis was made.

In the second case a " mad dog " bit a tame cheetah about the head and neck. Sixteen days later paralysis of the jaw developed and forty-eight hours later death from paralytic rabies occurred.

In commenting on these cases Leger says that it has long been a question whether there occurs in the Sudan and parts of West Africa a rabic virus which is transmissible from dog to dog, but not from dog to man. The present report is valuable evidence, but it does not solve the question completely. Certain investigators in Senegal have succeeded in transmitting the virus of West Africa in a certain proportion of cases to rabbits, but they have not been able to fix the virus. He believes that the European type and the African type of virus exist side by side in West Africa and the Sudan, and that therefore the present report does not furnish conclusive proof regarding the transmission of the African virus to man. Street virus, which is not dangerous to man, occurs both in Equatorial and in French West Africa.

Plantureux (E.). Traitement des animaux après morsure par le vaccin antirabique formolé. [**The Treatment of Animals with Formolized Rabies Vaccine after they have been bitten.**]—*Bull. Acad. Méd. Vét. France.* 1929. May. Vol. 2. No. 5. pp. 156–160.

While according to French law all carnivora bitten by rabid dogs must be destroyed immediately, the law does not apply to herbivora.

Since the war, and particularly in the Colonies, these animals have become very valuable, and rabies is frequently responsible for serious losses which could be avoided, or at least very greatly reduced, by the application of an effective anti-rabic treatment. Until recent years such a treatment could only be applied where there was an anti-rabic Institute at hand, and the treatment involved too many injections to be of practical value in veterinary medicine. This is not the case to-day because there are several vaccines which retain their efficacy for a sufficient length of time to be despatched to a distance. Among these is the formolized vaccine.

Preliminary tests were published four years ago in which four injections were given on the 4th, 6th, 9th, and 13th days after intramuscular inoculation with street virus. Of 11 dogs injected, only one contracted rabies, 20 days after the commencement of treatment. These results have not been entirely confirmed. In an exactly parallel experiment two of the treated animals contracted the disease 32 and 65 days respectively later.

While it is important to attempt to arrest the development of the disease in the minimum amount of time, it is also important to reduce the period of isolation and observation as much as possible from the economic point of view. It is most desirable that one should be as certain as possible that an animal will not develop the disease after a minimum period of a month and a maximum of about six weeks.

Having ascertained that the immunity is more solid the longer the interval between the injections of vaccine, the author has attempted to find what is the optimum distribution of doses of vaccine. After preliminary trials the following technique has been adopted :—

Four injections are given at intervals of a week, each dose being divided into two parts—

Animals	3 to 7 kg.	...	...	...	15 cc.
	7 to 20 kg.	...	...	...	20 cc.
	20 to 50 kg.	...	...	...	30 cc.

Two dogs were injected intracranially with 1/5 cc. of a 1/50 dilution of fixed virus three weeks after the last injection of vaccine, and two controls were inoculated at the same time. The vaccinated dogs survived, while the controls died. Four dogs which received the doses of vaccine at intervals of 3 and 5 days respectively died of rabies 8 to 15 days after the test inoculation. In a second experiment 12 dogs were injected intramuscularly with 10 cc. of a 1/30 dilution of street rabies. Six of these were kept as controls and the remaining six were put under treatment with vaccine 2 days later.

Five of the six controls contracted rabies in 7 to 25 days and three of the vaccinated in 16 to 29 days after treatment was begun. The three surviving vaccinated dogs were tested on the 106th day by intracerebral injection with fixed virus. One died of accidental infection—the brain was non-infective—and the other two survived. Six controls, used for preparation of vaccine, all contracted rabies in 6–8 days. As herbivora are likely to benefit by this treatment, the following experiment was carried out :—

Eleven goats ranging in weight from 9 to 12 kilogrammes were injected intramuscularly with 5 cc. of a 1/30 dilution of street virus. Six were put under vaccine treatment, beginning two days after inoculation, and five were kept as controls. None of the treated animals developed the disease, while all the controls died, symptoms having made their appearance from the 21st to the 52nd day after inoculation.

It would thus seem that if one can intervene with the vaccine within 2 days of an animal having been bitten it is almost certain that one will succeed. If a week has elapsed, there is still a good chance of success, but after that the chances of success definitely diminish.

TORRES (S.). Raiva. Estudos experimentaes. [**Rabies. Experimental Studies.**]—*Revist. Zootech. e Vet.* 1929. Vol. 15. No. 2/3. pp. 47–59.

The author found that fixed virus vaccine preserved in a refrigerator at 12–15° retained its virulence by subdural inoculation for 61 days. At ordinary tropical temperature the period was 21 days, after which virulence decreased. The brain substance was kept in a liquid containing glycerin, carbolic acid and salt solution adjusted to pH 7·4. Carbolic acid in a concentration of 0·425 per cent. at 42° C. appeared to exercise no action on the virus within 24 hours.

Further experiments showed that pH 7·4 was the most suitable reaction for the liquid used in preparing emulsions. At low temperatures the virus could be maintained in such a medium for 201 days, but at ordinary tropical temperatures the full virulence was maintained up to 78 days.

CURASSON (G.) & HANRAS. Un vaccin contre la péripneumonie bovine. [**A Vaccine against Bovine Pleuropneumonia.**]—*Bull. Acad. Vét. France.* 1930. Feb. Vol. 3. No. 2. pp. 95–98.

The authors find that the methods in use for the protective inoculation of cattle against bovine pleuro-pneumonia are very uncertain, and they report experiments with pleural exudate mixed with sodium citrate to prevent coagulation and treated with formalin at 4 per 1,000. The bottles of exudate are set aside in the dark and used after the third day.

In the first experiment two groups of three calves each were injected subcutaneously behind the shoulder with 5 and 10 cc. of the formolized exudate. Twelve days later they received a test inoculation in the other side. Typical swellings resulted, which were controlled by injections of novarsenobenzol.

In the second experiment three calves were given 50 to 75 cc. of the vaccine and three others 50 to 75 cc. of vaccine along with 2 cc. of active virus. Twelve days later the first three received an inoculation of virus. None of the six showed any reaction, and a further injection of virus into the three which had been simultaneously inoculated produced no effect.

Six calves were given 50 to 75 cc. of vaccine which had been kept at about 40° C. for 2½ months. Eight hours later they were given 2 cc. of virus. One died of pasteurellosis and the other five developed swellings at the seat of injection 8–10 days later. In the case of one of these the swelling was progressive and had to be controlled by novarsenobenzol. These animals were thus only partially immunized, and it appears that at 40° C. the vaccine loses its activity rather rapidly.

An opportunity soon offered to test the vaccine on a field scale. An outbreak occurred in a herd numbering 341 head. The disease had not appeared on these premises since 1921 when the herd was formed, and consequently the immense majority of the animals were most probably susceptible. 82 cows were inoculated by the Willems method with disastrous results—33 per cent. died. About three weeks later

formolized vaccine was injected in the following doses. Unweaned calves, 10 cc. ; yearling bulls and heifers, 20 cc. ; adults, 40 cc. One month later the losses since the Willems inoculation was employed amounted to 28 cows, 22 bulls, 6 heifers and 9 yearling bulls. Experience had shown that the dose was small, and the bulls were therefore then given 100 cc. of vaccine. From a fortnight after this injection it was thought it would have become effective. From this date until two and a half months later, when it was considered that the outbreak was at an end, the following animals died : 2 cows which were ill prior to the injection of the bulls with 100 cc., 3 bulls which became ill during the fortnight following the injections of 100 cc., 1 heifer and 12 yearling bulls.

The final results were : 47 bulls dead out of 121, 33 cows out of 82, of which 27 deaths followed the Willems vaccination, 27 bullocks out of 95, and 11 heifers out of 43. In the bulls, therefore, the disease was clearly controlled by the large dose of formolized vaccine.

As regards the young bulls and heifers, it is impossible to assess the different factors. They had received a dose of vaccine sufficient to produce a partial immunity, but they were isolated rigidly for about three months, and finally it is well known that young animals are less susceptible than adults.

The author thinks that the rather large dose of formolized vaccine is not really a disadvantage because one frequently obtains four or five litres of exudate from natural cases of the disease.

It is suggested that it may be possible to prepare a more active vaccine from pulped lung lesions and glands.

DELPY (L.). Les formes atypiques de la peste bovine et les porteurs de virus (2e note). [**Atypical Forms of Cattle Plague and Carriers of Virus.**]—*Rev. Gén. Méd. Vét.* 1930. Mar. 15. Vol. 39. No. 459. pp. 138–141.

The author draws attention to a previous publication in which reference is made to atypical forms of rinderpest having the following characters : absence of fever, prolonged period of development, the possibility of transmitting this form of disease from calf to calf either experimentally or naturally, and the reappearance of the disease in classical form after a certain number of passages. The author has recently encountered further examples of the atypical form of the disease in an outbreak.

Two calves bought from a herd which had recently been attacked appeared to be perfectly healthy. They were transported by canoe—the journey taking twenty days—to an island where the cattle were healthy. On arrival they showed some diarrhoea and lachrymation. Within the next few days other animals began to show similar symptoms. They were not sufficiently severe to be considered as due to cattle plague. On the 32nd day after the arrival of the calves typical rinderpest broke out.

In a second case rinderpest was diagnosed at a village, the affected animals showing diarrhoea, lachrymation, and distinct buccal lesions. In no case did the temperature exceed 40° C. Blood was injected into healthy calves. Lesions began to appear on the gums. Neither calf had shown a temperature higher than 40·5° C. It was intended to carry out sero-inoculation, but as it was thought undesirable to use an atypical virus, two calves suffering from typical rinderpest were

obtained from another infected centre. Two calves inoculated from these developed the typical disease and their blood was used for the double inoculations. The blood of one of these was injected into two of the calves in the herd which had had the atypical form of the disease. They developed typical rinderpest which proved fatal. [There seems to be a slip in the numbering of these calves in the original. It would appear that No. 3 should have been No. 2.]

CONTI (P. A.) & VAN DAC (Ng.). Utilisation du porcelet pour l'entretien du virus pestique servant aux pratiques d'immunisation antipestique. [**The Use of Young Pigs for the Maintenance of Virus used in Rinderpest Immunization.**]—*Rec. Méd. Vét. Exot.* 1929. Oct.–Dec. Vol. 2. No. 4. pp. 205–215. With 11 charts.

For the last two years virus has been maintained by the Veterinary Service at Laos in young pigs. Passage from pig to pig is effected by withdrawing the blood from the jugular between the 72nd and 96th hours, defibrinating it and injecting it in doses of 5 to 10 cc.

The virus has actually been passed through 174 passages, utilizing 382 pigs. Its virulence has remained constant.

The best reactions are obtained with pigs 3 to 4 months old and weighing 4–5 kg.

The temperature rises the day after inoculation and reaches its maximum on the evening of the second day. There are symptoms of general disturbance, dullness and loss of appetite. On the third day there is congestion of the skin and mucous membranes, and virus should be collected before necrosis of the mucous membrane occurs. By the fourth day the mucous membrane of the alimentary tract is involved, and the faeces, while still formed and firm, are covered with a mucous exudate. Diarrhoea sets in by the 5th day.

It must be remembered that infection in young pigs may cause so mild an attack that it would escape superficial observation. Virus collected on the fourth day may, however, produce a severe attack in the next pig of the series.

Blood is collected either from the jugular or from the heart, but while heart puncture does not cause any marked disturbance of healthy pigs it invariably causes death in pigs infected with cattle plague virus.

In collecting from the jugular the skin and underlying tissues are incised to expose the vessel. The blood is withdrawn into a syringe of 20 cc. capacity fitted with a needle 1·5 mm. in diameter and 8 centimetres long. After the operation the wound is sutured.

In healthy pigs the operation is without sequelae, the wound generally heals directly, but in infected pigs it aggravates the disease.

In a supplementary note the authors state that from the 175th passage they tried infection by scarification instead of by injection.

From the 5th or 6th day, prior to the onset of diarrhoea, a drop of blood is taken by puncture of a vessel in the tail and rubbed into scarifications on the forehead of the next pig. The disease transmitted by this means runs a course which is remarkably constant in its features.

On the 3rd day there is already a marked rise of temperature and slight congestion of the visible mucous membranes.

On the 4th day appetite is reduced, the conjunctiva is infiltrated and there is gingivitis.

On the 5th day there is marked dullness, muco-purulent conjunctivitis, and ulceration of the mouth lesions.

On the 6th day there is great depression, appetite is further lost, the faeces are formed but covered with mucus.

On the 7th day diarrhoea sets in, there is evidence of naso-pharyngitis, and respiratory distress is observed.

Death usually takes place on the 8th or 9th day.

Post-mortem examination confirms the presence of the inflammation of the naso-pharynx and larynx. There is severe gastritis, the epithelium shows ecchymoses, and is to some extent destroyed. The greater part of the mucous membrane of the colon is necrotic and comes away in flakes. There is endocarditis, which is particularly marked in the neighbourhood of the auriculo-ventricular valves.

The authors publish a number of temperature charts of infected pigs, and also some charts of goats and buffaloes inoculated with virus from pigs.

BOSSELUT. Enzootie de fièvre aphteuse chez le chien. [**Enzootic of Foot-and-Mouth Disease in the Dog.**]—*Bull. Acad. Vét. France.* 1929. Dec. Vol. 2. No. 10. pp. 352–354.

The author describes a dog, 10 months old, which was brought for his examination.

The animal was dull, and was not feeding. The temperature was 40·5°. Examination for piroplasmosis was negative. Examination of the throat showed congestion and swelling with vesicles resembling those seen in foot-and-mouth disease. Three other dogs on the same premises had recently presented the same lesions, and the author, on examining these, found typical vesicles between the toes and round the claws. There was no salivation, and no vesicles appeared on the tongue or gums. Foot-and-mouth disease had been present in the immediate neighbourhood for a fortnight, and for this reason the owner stabled his cow. The dogs had free access to the stable and shortly after this the cow developed the disease.

BOUCHET, in discussing this case, points out that there is no proof that the lesions shown by the dogs were those of true foot-and-mouth disease.

PICARD (W. K.). **Pseudo-Fowlpest.**— *Veterinary Bulletin No. 65. Dept. Agric., Indust., & Commerce, Dutch East Indies.* 46 pp. With 10 figs. and 4 charts on 8 plates.

DE SOUZA (M. A.). A raiva em bovinos no Estado de Matto Grosso. [**Rabies in Bovines.**]—*Revist. Zootech. e. Vet.* 1929. Vol. 15. No. 2/3. pp. 65–82.

MISCELLANEOUS.

BULL (L. B.). **Poisoning of Sheep by Soursobs** (*Oxalis cernua*): **Chronic Oxalic Acid Poisoning.**—*Australian Vet. Jl.* 1929. June. Vol. 5. No. 2. pp. 60–69. With 2 figs.

The losses occurred on a grazing area, which had until recently been used for the production of wheat, and which showed little or no vegetation other than *Oxalis cernua*. The outstanding symptom was tetany. Affected animals remained in good condition and there was no loss of appetite in most cases. Examination of the urine showed that it was alkaline. Treatment with calcium chloride was followed by an

improvement in condition. In a second outbreak many of the animals which died were not observed to have presented any symptoms of illness, but a few showed stiffness of gait, and one was seen to move about on its knees.

Post-mortem examinations showed peritoneal, pleural and pericardial effusions and the kidneys were almost white in colour. On section the kidneys were found to be abnormally tough, the cortex was reduced in size and showed numerous glistening points and streaks. Ecchymoses were found in the duodenum.

Microscopic examination of the kidneys showed that there was little change in the glomeruli, but there was fibrosis of the whole cortex with extensive destruction of the tubules. Throughout the cortex and boundary zone there were collections of crystals which showed either a radiate or sheaf-like arrangement. Chemical tests indicated that the crystals present were calcium oxalate.

There is no known method of ridding a pasture of soursobs, and sheep and cattle should not be placed on pastures where the growth of the plant is luxuriant. To check its growth the land should be overstocked in the early stages of growth, and sheep should not be kept on the land for more than three or four weeks. It is suggested that licks of calcium chloride would possibly prove of value, but these would require frequent renewal.

Quin (J. I.). **Further Investigations into Geeldikkop** (*Tribulosis ovis*).—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 765–767.

Batches of lambs fed on young preflowering Tribulus, flowering Tribulus, and late-fruiting Tribulus and nothing else, nearly all developed geeldikkop at the same time.

A batch of lambs placed on the same ground after very heavy rain (about 4 inches) all failed to develop symptoms.

Juice expressed from the plant in fruit used as a drench promptly produced death. Juice from 3 lb. of the plant was necessary for this purpose. No symptoms were produced, and the only lesion discoverable was a chocolate colour of the blood.

An animal fed with ½ lb. dry powdered Tribulus hay twice daily for three days showed only slight tympanites.

In two experiments watery extract of about 1 lb. of the hay caused death within 1½ hours; symptoms of dullness and inco-ordination of movement appeared about 15 minutes before death occurred. The only abnormality recognizable at post-mortem was a chocolate coloration of the blood. Spectroscopic tests suggest that the pigment has been converted into some such compound as methaemoglobin. A similar result can be obtained *in vitro* with aqueous extract of Tribulus hay.

The further relationships of toxic principle to the production of the disease have not been elucidated.

Quin (J. I.). **The Toxic Properties of** *Cucumis myriocarpus* **Naud., and** *Cucumis africanus* **Linn.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 769–775.

Both these plants, especially when the fruits are ripe, have been found to be toxic for animals. The toxic principle is stable and will

resist prolonged boiling. *C. myriocarpus* appears to contain more of the principle than *C. africanus*, and the principle is possibly of a resinous nature. No full explanation of the action has been arrived at as yet, but it would seem that some injury is done to the endothelial cells of the capillaries in the lungs allowing plasma to escape into the alveoli and bronchioles.

DUMAS (A.). De l'injection, par voie intraveineuse, de substances irritantes, et de son innocuité. [**The Intravenous Injection of Irritant Substances and its Harmlessness.**]—*Rév. Vét. et. Jl. Méd. Vét. et Zootech.* 1930. Mar. Vol. 82. pp. 139–141.

The author thinks the general recommendations that substances irritating to connective tissue should for intravenous injection be employed in dilute solution and given very slowly are not sound. It is impossible to keep an animal such as the horse still for several minutes at a stretch, and this increases the danger of displacement of the needle from the vein. In his opinion rapid introduction of the drugs overcomes this difficulty. In order to prevent the introduction of the drug into the subcutaneous tissue when the needle is being withdrawn, he recommends that the syringe be filled and emptied with blood two or three times before the needle is withdrawn.

DU TOIT (P. J.) & BISSCHOP (J. H. R.). **The Breeding of Cattle on Phosphorus Deficient Veld.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 1059–1166. With 71 figs. & 14 graphs.

Apart from prevention of lamsiekte, the administration of bone meal was found to have a remarkable effect upon the fertility of cows, and calves born of dams which have received bone meal and which have themselves also received the ration attain sexual maturity at an earlier age. The administration of bone meal to cows does not seem to make any alteration in the weight of calves at birth, but it certainly influences the rate of growth.

DE KOCK (G.). **Pathology of Phenol Poisoning in Sheep induced by Certain Dips.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 643–656. With 4 figs.

The author reports cases of poisoning by phenol dips absorbed through intact skin. Acute symptoms of dyspnoea appeared within 24 hours of dipping and a number of sheep died within 48 hours, while others lingered three or four days.

The lesions found were marked cyanosis, the presence of exudates in the pericardial and pleural cavities, congestion and emphysema of the lungs. No lesions were found in the alimentary tract.

Microscopic examination of sections revealed, as the most characteristic lesion, extensive hyperaemia associated with a change in the contour of the cells lining the alveoli. These had become cubical in shape, and in many cases the epithelial lining appeared to have become completely detached.

STEYN (D. G.). **A Note on the Symptomatology of Phenol Poisoning in Sheep induced by Certain Dips.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 657–658.

The phenol dip was made up according to the directions, and the water used was tested for hardness. The latter precaution was taken because the instructions for use indicated that hard water was not suitable. Symptoms appeared 10–48 hours after dipping had taken place. The animals were dull, and showed a bilateral dirty brown nasal discharge, with well-marked salivation. The breath smelt strongly of carbolic acid, the visible mucous membranes were cyanotic. Pulse rate was 100 to 148 per minute, strong at first, but subsequently almost imperceptible. Temperature ranged from 100·2° F. to 103·8° F. Dyspnoea was very marked.

Death usually takes place in about 15 hours after the onset of symptoms.

THOMAS (A. D.). **Skin Cancer of the Angora Goat in South Africa.**—*—Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 661–761. With 50 figs.

Cancer, particularly of the perineal region, is not uncommon in Angora goats in South Africa, and females are more often affected than males.

The author has examined 16 cases. In 13 of these the perineum was the seat of the lesion, in one case each the ear, horn, and skin of the neck.

The tumours found were classified in three groups: (1) Undifferentiated epithelial cell tumour or basal-cell carcinoma; (2) differentiated cell tumour or spinous-cell carcinoma, ; and (3) mixed forms of these.

The first type was almost invariably very closely associated with the basal cells of the epidermis.

Attempts to transmit the lesion experimentally in a number of ways failed, and no growths could be produced in goats with a tar which succeeded with rabbits.

DE KOCK (G.). **Are the Lesions of Jaagsiekte in Sheep of the Nature of a Neoplasm?**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 611–641. With 15 figs.

The author briefly refers to the findings of MITCHELL and COWDRY in connexion with the lesions of jaagsiekte, and then states that his own object was to investigate the following points:—

(1) Do the lungs of sheep from infected areas show the changes which COWDRY maintains constitute the primary lesions?

(2) Can the "proliferations" of the respiratory epithelium be regarded as primary and of the nature of a neoplasm?

(3) What is the significance of the lymphoid hyperplasia in the lung, referred to by MITCHELL, and was he in all instances dealing with one and the same disease?

In tabular statements the author gives the essential points of 129 cases. He was not able to find interalveolar infiltrations as primary lesions, but papilliform "proliferations" were recognized in very early

lesions. The majority of these arise from alveolar epithelium, but the epithelium of the bronchioles may also play a part in the process.

" In view of the structure of these papilliform proliferations and their growth without hope of regression, these growths are most probably true neoplasms complicated by a terminal pneumonia. They are probably in the nature of papilliform cyst-adenomata. The nodules, together with the pneumonia and the fibrosis, invade the lung substance from the cranio-ventral to the caudo-dorsal aspect.

It is possible that in South Africa there may be two specific diseases of the sheep's lung characterized by :—

(*a*) Chronic indurative catarrhal pneumonia with lymphoid hyperplasias(?), or infiltrations(?) and typical epithelial proliferations, and

(*b*) Multiple papilliform cyst-adenoma complicated by terminal pneumonia.

DE KOCK (G.). **Haemo-Lymphoid-like Nodules in the Liver of Ruminants a Few Years after Splenectomy.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 577–610. With 17 figs.

The author describes the presence of small nodular structures resembling haemo-lymph glands in the livers of animals which had been splenectomized three years previously.

BEDFORD (G. A. H.). **The Effect upon Ticks of Dipping Cattle regularly at Short Intervals in Arsenical Baths.**— *Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 1. pp. 551–573. With 1 chart.

The author describes experiments carried out on a grossly infected East Coast Fever Farm at Sycamore, which was taken over by the Veterinary Division in September, 1927.

Two sets of experiments were carried out :—

A. Cattle dipped in 5-day dip (AS_2O_3 0·16 per cent.).
   (1) Animals hand-dressed with tobacco and oil and their ears and tails clipped.
   (2) Animals hand-dressed with arsenite and their ears and tails clipped.
   (3) Animals not hand-dressed but ears and tails clipped.
   (4) Animals hand-dressed with tobacco and oil but not clipped.

B. Cattle dipped in 3-day dip (AS_2O_3 0·08 per cent.).
   (1), (2), (3) and (4) As above, and in addition
   (5) Animals neither hand-dressed nor clipped.
   (6) Animals hand-dressed with arsenite but not clipped.

The experiments yielded results upon which the following conclusions are based :—

Plain arsenical dip at 3- to 5-day strengths, laboratory and copper sulphate dips at 5-day strength, and Cooper's dip kill a very large percentage of ticks on animals dipped regularly. Female ticks which survive dipping and engorge die without laying eggs, or their eggs do not hatch.

Arsenical dip is not improved to any practical extent by the addition of other ingredients. Dips do not act as deterrents to ticks, but a considerable proportion of ticks attaching themselves to animals that have been dipped within the previous 48 to 72 hours are killed.

Dipping is effective for the destruction of ticks under the tails of animals. Spraying is not superior. Dipping is more effective for the destruction of ticks on the bodies than on the head and in the ears, but clipping the ears did not appear to offer any special advantage.

Larvae and nymphs normally live only in the ears, and they can be dealt with satisfactorily by applying hand-dressing every 3 days.

Regular dipping should be carried out on infected farms every 5 days, and on non-infected farms every 5–7 days. Dipping cannot be relied upon to kill adult ticks within 3 days—the time required for the tick to infect the host.

R. appendiculatus in the ears, *R. evertsi* under the tail, and *R. simus* about the fetlocks and tail brushes must be dealt with by local dressing. The available evidence is against the plan of using a stronger dip, 0·24 per cent. AS_2O_3, at long intervals (14 days) for destruction of *A. hebraeum*, the transmitting tick of heart-water.

WIGGLESWORTH (V. B.). **Some Notes on the Physiology of Insects related to Human Disease.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Apr. 17. Vol. 23. No. 6. pp. 553–570. With 6 text figs.

The author deals with the physiology of the digestive system and the physiology of the respiratory system, pointing out that there are many other factors concerned. The digestive system must be intimately associated with the life-cycles of insect-transmitted parasites, and the respiratory system is one of the most vulnerable to poisonous agents directed against them. The author deals with the digestive system of an omnivorous insect and then compares it with that which has become strictly adapted to a diet of blood.

In view of the diet the whole range of enzymes present in the human alimentary tract is represented in the alimentary ferments of the cockroach with the exception of pepsin.

The reaction of the mid-gut contents is always about pH 6·2, that of the saliva pH 6·9, and that of the crop pH 5·2. This latter acidity is due to the action of bacteria on the carbohydrates in the diet.

The average reaction is considerably more acid than that of the intestinal contents of man.

Probably the different insects which have acquired the habit of sucking blood have developed along different lines, so that the results of the study of a single species may not have a general application. The author deals specifically with the tsetse fly.

The alimentary tract of this fly differs very widely from that of the cockroach, and no comparison is possible, but it may be compared with the closely allied house-fly and bluebottle. While anatomically the alimentary canal of the tsetse fly and the bluebottle closely resemble one another, there are some important differences of function.

The saliva of the bluebottle is rich in amylase, which is absent from that of the tsetse fly. On the other hand, the saliva of the tsetse fly contains an anti-coagulant ferment, and it serves to wash out the proboscis to prevent it from becoming occluded with blood, and it ensures that the blood in the crop remains fluid, so that it may be passed on. Reference is made to the Hippobosca fly, which it is said has no crop. In the discussion HOARE pointed out that this was not correct.

The crop of Glossina always contains a bubble of air, and while the blood is there it is always oxygenated, but when it is passed back to the

proventriculus it soon becomes venous in colour, the fluid is absorbed and the corpuscles become cheesy. With a change in the type of intestinal epithelium, about two-thirds of the way along the intestine the blood also undergoes a change, becoming dark brown or black. In the final third of the intestine secretory vacuoles appear in the epithelial cells, and the blood is digested. Towards the hind-gut simple epithelium is again present. The maximum enzyme action, and possibly the only enzyme action, occurs in the middle portion of the intestine; trypsin and erepsin and probably also lipase are present.

The reaction of the gut contents of Glossina is about pH 6·4.

In the bluebottle there is an active amylase throughout the mid-gut, and a very active invertase and maltase in the posterior part of it. A very feeble trypsin and erepsin are present in the posterior part of the mid-gut.

At present our only knowledge of special adaptation of the tsetse fly is the disappearance of enzymes acting upon carbohydrates. Possibly there are special changes in the absorptive properties of the mid-gut.

The gut of the tsetse fly contains elongated strips of greatly enlarged cells whose cytoplasm is stuffed with rod-shaped but highly pleomorphic organisms resembling bacteria (bacteroids). These are transmitted to offspring by secretion of the milk glands.

The function of these structures is not known and the author doubts the accuracy of ROUBAUD'S view that they assist in the digestion of blood and that after a meal the cells break down and liberate the bacteroids. They appear to contribute something to the host's economy, and it would seem that they are found only in insects which throughout their life take no food but blood. It is suggested that they may manufacture an accessory growth factor.

The author does not accept the claim made in the League of Nations' Report, 1928, that the presence of these bacteroids is incompatible with the development of trypanosomes.

The proventriculus in Glossina forms a sphincter between the fore-gut and mid-gut, and it also produces the peritrophic membrane. The peritrophic membrane is produced from a secretion produced by the portion of the proventriculus covered by the invaginated fore-gut. [For exact details the original must be consulted.] This delicate chitinous sheath extends unbroken far into the mid-gut, separating the gut contents from the epithelium. It appears to be freshly formed with each meal.

Physiology of Respiratory System.—

It is still a matter of doubt whether the terminal ramifications of tracheal tubes penetrate the tissue cells or branch around them. But it appears to be certain that in some instances, as, for example, the flight muscles and the secretory cells of the mid-gut of Glossina, they actually penetrate the cells. The author has made observations to show that the extremities of the tubes actually contain liquid, as was believed by earlier authors.

There is evidence to show that diffusion alone is sufficient to ensure ventilation without movement, but in some of the large insects the main tracheal trunks are elliptical in cross section and compressible.

Wigglesworth has been elaborating a theory that the terminal tubes are bounded by a membrane which is semi-permeable to such metabolites as lactic acid, which leads to passage of water into the tubes by hydrostatic pressure and subsequent withdrawal by changes

of osmotic pressure in active tissues. These changes of fluid level are counterparted by changes in air level in the tubes.

The author gives an account of experiments with *Aëdes argenteus* larvae supporting this view.

NOELL (R.). Quelques cas de coryza gangréneux des bovidés en Tunisie. [**Cases of Gangrenous Coryza of Bovines in Tunis.**]—*Rec. Méd. Vét. Exot.* 1929. Oct.–Dec. Vol. 2. No. 4. pp. 203–205.

In some native cattle at a farm near Tunis cases occurred presenting the following symptoms : Serious lesions of the eyes, blood-stained discharge or coughing, blood-stained faeces, and in some cases urine also. Shortly before death there was very marked swelling of the lower part of the head. The cases ran their course, terminating fatally in from 2 to 6 days.

The author had the opportunity of seeing 4 cases alive (2 were calves). There were intense lachrymation with ulcerating keratitis, small plaques on the superior surface of the tongue and ulceration on the inner surface of the cheeks, dilatation of the nostrils, intense congestion of the pituitary membrane, and a nasal discharge flecked with blood. The animals were coughing. The faeces were slightly blood-stained, and all over the body there were small swellings which are described as resembling the heads of nails. On the following day the animals all had practically normal temperatures, but keratitis persisted in two of them. The others were apparently quite normal.

These particular animals had been grazing in a certain "oued" along with others, but it was only in this batch of animals that the cases occurred. The animals were removed elsewhere and no other cases occurred.

The author suggests that the stagnant water was possibly connected causally with the cases.

VELU (H.). Comment concevoir la pathologie ovine aux colonies ? [**What Conception should be formed regarding Ovine Pathology in the Colonies ?**]—*Rec. Méd. Vét. Exot.* 1929. Oct.–Dec. Vol. 2. No. 4. pp. 185–203.

The author points out that the statistics published by the International Institute of Agriculture in Rome show that during 1926 the French colonies produced over 25 million sheep, of which nearly two-thirds were raised in Northern Africa. In this paper the author deals more particularly with the diseases occurring in the colonies bordering on the Mediterranean. His aim is to survey the pathological problems presented by this region and to suggest that they should be viewed in a special manner and further special measures adapted to application on a large scale should be devised to solve these problems. Northern Africa lies, so to speak, between the temperate and the tropical countries, with the result that cosmopolitan and tropical diseases are both encountered within the limits of the area.

Two main groups of diseases occur in Morocco, namely :—

1. Acute diseases of a septicaemic type.
2. Chronic diseases characterized by anaemia and cachexia with or without febrile attacks.

All the diseases in these two groups bear considerable general resemblance to each other.

Veterinarians arriving in the country find themselves at an almost complete loss to understand the problems presented to them. Diagnosis is fraught with great difficulty.

In a certain number of cases training in laboratory technique enables a diagnosis to be made by the veterinary surgeon on the spot, but in perhaps the majority of cases a laboratory is not in a position to solve the problems presented. There should be closer contact between field workers and the research laboratories, because it is only in the field, in many instances, that the all-important data can be gathered.

Velu thinks that research laboratories have concentrated too much upon the microbiological side of the problems leaving the biological side too much alone.

Rapidity and accuracy of diagnosis are of supreme importance, as diseases may spread with alarming rapidity.

The colonial veterinary surgeon is, above all, a sanitary authority, and it sometimes happens that he must neglect the sick in order to place the healthy in a place or condition of safety. He is, in fact, not the medical attendant of the individual, but a health agent.

The four main principles which govern his work are (1) prompt detection, (2) destruction of the infective agent, (3) protection of flocks, (4) prompt removal of infective animals.

The whole-hearted co-operation of the stock raiser is essential. He must learn what to send for examination and how to send it. He must be prepared to face the cost of the action necessary to control disease as a part of his ordinary expenses of stock raising.

Broadly speaking, the struggle must be maintained against inclement climate, external parasites, internal parasites, and bacterial diseases. This struggle can only be maintained by continued and extensive practical application of practicable measures. The issuing of orders is of itself of no avail.

The author then summarizes the principal diseases and the methods of dealing with them.

Bečka (J.). Die Osteomalacie, ihr Entstehen und ihre Therapie vom Standpunkte der Biochemie. [**Osteomalacia, its Nature and its Treatment from the Biochemical Point of View.**]—*Prager Arch. f. Tiermedizin.* 1929. Vol. 9. Part A. No. 1 & 2. pp. 3–11.

Osteomalacia is a pathological calcium metabolism, which eventually becomes an acidosis. The regulation of the calcium in the body depends upon magnesium. For every ion of magnesium introduced into the body about 10 ions of calcium are introduced. This rule holds good not only for the absorption of calcium from the food, but also for a biological estimation in the body and also for the excretion of calcium from the body. The magnesium compounds are divided into three groups depending upon their content of calcium: (*a*) Magnesium sulphate, which prevents the resorption of calcium from the food, and rapidly removes the calcium, particularly by way of the intestine; (*b*) magnesium chlorate, which effects an easier resorption of the calcium, holds it in the body for a short time, during which the calcium is biologically active. The excretion of the calcium takes place via the kidneys; (*c*) magnesium hydroxide effects a marked resorption of the calcium from the food in the proportion of 1 to 70 in the course of

5 to 10 days. The calcium is biologically active and is finally excreted through the kidneys. Biologically three stages of osteomalacia are recognizable : (1) " Disposition " ; (2) Pre-osteomalacic ; and (3) Clinical osteomalacia.

(1) In the " Disposition " stage attention must be paid to general hygiene, correct food must be supplied, and the demands made upon the animal's constitution, production of milk, etc., must not be excessive.

(2) In the pre-osteomalacic stage subcutaneous, intravenous or intramuscular injections of 100 cc. of 1 per cent. magnesium hydrate should be given to prevent acidosis and regulate the absorption of calcium. Diet containing vitamin preparations and resorbable calcium must be given.

(3) In the clinical stages of the disease treatment with magnesium hydrate must be intensive. If one injection is not sufficient on the fourth day 200 or 300 cc. should be given. Suitable diet must be provided.

NESER (C. P.). **Vlei Poisoning. (Valley Poisoning.) (Veld Poisoning.) Part I.** —*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 805–814. With 1 fig.

MOGG (A. O. D.). **Vlei Poisoning. Part II.—Ecology.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 815–830. With 1 fig.

STEYN (D. G.). **Recent Investigations into the Toxicity of Known and Unknown Poisonous Plants in the Union of South Africa.**—*Union of S. Africa. 15th Report, Director Vet. Services.* 1929. Oct. Vol. 2. pp. 777–803.

REPORTS.

BURMA. **Report on the Civil Vet. Dept., (including the Insein Vet. School) for the year ended 31st March, 1929.** [MCKERRAL (A.)].—pp. 5+32. With 1 map & 3 charts. 1929. Rangoon. [Rs. 1–4–0=1s. 11d.]

Rinderpest. Trials are being begun of the serum-simultaneous inoculation of animals against rinderpest with the herds belonging to the agricultural department. Four series of animals, with controls, were inoculated ; the dose of serum used was 5, 7, 9 and 11 cc. per 100 lb. in the four series. There were five animals in each batch. The results were all favourable ; although some of the animals gave rinderpest reactions they recovered.

In an outbreak among 400 head of cattle five methods of procedure were tried :—

1. Special serum plus virus.
2. Special serum only.
3. Ordinary serum plus virus.
4. Double dose of ordinary serum alone.
5. Ordinary serum alone.

The " ordinary " serum and " special serum " were obtained from Muktesar; the special serum is of very high potency.

1. 46 animals. One became ill and recovered. One died of intercurrent disease.

2. 18 animals (age 1–2 years), temperatures 103–105° F., given special serum 7 cc. per 100 lb. One became ill. All recovered.

3. 65 animals, temperatures 103–105° F. given double dose of ordinary serum and 0·5 cc. virus. Nine animals died, others became ill and recovered.

4. 20 animals, temperatures 103–105° F. double dose ordinary serum alone. 11 deaths.

5. 233 animals given normal dose of ordinary serum as follows:
   Cattle with normal temperature, minimum dose, 40 cc.
   Cattle with high temperature, minimum dose, 60 cc.
   Cattle calves, minimum dose, 20 cc.
   Buffaloes, minimum dose, 80 cc.

11 deaths.

The conclusions drawn were:—

1. Special serum is safe for all animals and it is suggested that 7 cc. (per 100 lb.) plus ½ to 1 cc. of virus be used.

2. Surra may appear as a complication, but there was no evidence of piroplasmosis.

Anthrax. Local strains of anthrax were procured from elephants, horses, and cattle, and attenuated with a view to the preparation of a spare (presumably "spore") vaccine. A strain of bovine anthrax used in South Africa for the preparation of vaccine was also obtained. The immunity conferred by this strain against infection with a local elephant strain was very high. A test virus was used which was found to be lethal for sheep in a dose of ·00005 cc. Vaccinated sheep and cattle received 500–1,000 m.l.d. of this virus and no deaths resulted.

Experiments on a small scale on elephants are in progress.

REVIEWS AND NOTICES.

VELU (H.). [Vétérinaire-Capitaine, Chef du Laboratoire des Recherches du Service de l'Élevage]. **Alimentation et aliments du bétail au Maroc.**—pp. vi+168. With 3 text figs. Protectorat de la Republique Française au Maroc. Gouvernement Cherifien. Direction de l'Agriculture, du Commerce et de la Colonisation. Publication du Service de l'Élevage. 1930. Casablanca.

It is clear that Dr. Velu's experiences have led him to conclude that much progress could be made with animal husbandry in Morocco if greater attention were paid to scientific feeding. He has written an interesting book. The first part deals with the constituents of foodstuffs and their physiological functions and the author discusses the requirements of a properly balanced ration. The methods of preserving green crops are carefully explained and due consideration is given to what is, admittedly, an important section of agriculture, particularly in countries liable to dry periods.

The second part deals largely with the particular foods available in the country and shows how pasturage might be improved. Valuable information is given regarding the most suitable forage crops to cultivate.

Owing to the scarcity of animal food in Morocco the author urges that greater attention should be paid to the early fattening of animals, as in the production of baby beef. He stresses the point that in any country where foodstuffs must be conserved, it is uneconomic to use large quantities of nourishment merely for the maintenance of a non-productive body. This has particular application to semi-arid areas. If economical feeding is important in temperate climates then, as the author has set himself out to show, it is an obvious necessity in countries where pasturage is more difficult.

In short, Dr. Velu has written a plea for the adoption of modern methods of stock feeding and, moreover, has pointed out to the agriculturist how this can be done. It remains for the farmer to take advantage of the sound teaching given in pages of this book.

R. G. Linton.